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ABSTRACT

Since the end of World War II the public community college has grown in significance, and it is now the most rapidly multiplying educational institution in the country. This review of literature examines the role of these community colleges in occupational education in terms of methods of operation and extent of offering. Occupational preparation at the secondary school level is insufficient, which puts a heavier responsibility on the community college. One problem in fulfilling this responsibility is the financial limitations of the 2-year colleges in setting up proper training facilities and equipment. Literature on entrance requirements and characteristics of enrolling students, curriculum, administration, and methods of instruction are all discussed in this report, which should be of interest to community college administrators, curriculum planners, and educators. The author includes his recommendations for needed additional research, and an extensive bibliography. (Author/GEB)

Information

Series No. 55

VT 014 687

review and synthesis of

LITERATURE ON OCCUPATIONAL PREPARATION IN THE COMMUNITY COLLEGE

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REVIEW AND SYNTHESIS OF LITERATURE ON OCCUPATIONAL PREPARATION IN THE COMMUNITY COLLEGE

Lewis R. Fibel
Professor of Education
College of Education
Virginia Polytechnic Institute and State University
Blacksburg, Virginia

ERIC Clearinghouse on Vocational and Technical Education
The Center for Vocational and Technical Education
The Ohio State University
1900 Kenny Road Columbus, Ohio 43210

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PREFACE

The role of community colleges in occupational education is examined both in terms of methods of operation and extent of offerings.

The author notes that there is insufficient occupational preparation given at the secondary school level. This puts a heavier responsibility on the community college. One problem in fulfilling this responsibility is the financial limitations of two-year colleges in setting up proper training facilities and equipment. The community college curriculum is discussed both in general and specific terms. Entrance requirements for students as well as student characteristics are analyzed.

Community college administrators, curriculum planners and educators interested in community colleges will appreciate this current report.

The profession is indebted to Lewis R. Fibel, Virginia Polytechnic Institute and State University, for his scholarship in the preparation of this report. Recognition is also due Amo de Benardes, Portland Community College, and Norman C. Harris, University of Michigan, for their critical review of the manuscript prior to final revision and publication.

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Robert E. Taylor
Director
The Center For Vocational and
Technical Education
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INTRODUCTION

The junior college has been on the scene of American higher education for more than one-half a century, but only significantly since the end of World War II has the public community college developed. It is in this institution that post-secondary occupational education first became important.

The author has reviewed the literature listed in *Research and Education* (RIE) from November 1966 to April 1971 and the *Current Index to Journals in Education* (CIJE) for a like period. Although there are a very substantial number of articles in the literature that pertain to this general topic, there are very few that endeavor to synthesize the status of the literature at any given time. This the author has attempted to do, so that the work might become a benchmark for others engaged in study in the same field. The author has also given in the last chapter his recommendations for needed additional research in this field.

Special appreciation is felt for the contribution of Sandra Turk in the preparation of the manuscript and of the bibliography.

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THE EDUCATIONAL SETTING

Two-year colleges in the United States have a long history. The first public two-year college was probably founded in Joliet, Illinois, about the turn of the century. Private junior colleges have a history going back into the nineteenth century and have their roots in various finishing schools, technical institutes, and the like. In the last several decades, the two-year college in America has been characterized both by substantial growth and by proliferation into a variety of types.

Community Colleges

The public community college is initially an outgrowth of the boom in higher education that resulted with the return of veterans after World War II. A. Crawford (1970) described the history of the public community junior college movement in the United States with special emphasis on the impact of World War II on the character of junior colleges. An extensive bibliography of materials relating to the development and growth of public community and junior colleges has been prepared by the College of Education, University of Florida (1968). A quadrennial directory of the institutions that fall in this category is published by the American Council on Education. The American Junior College included in two introductory chapters substantial discussion of such matters as finance, accreditation, and control of community colleges. (American Association of Junior Colleges, 1967.)

The two-year college is the most rapidly multiplying educational institution in the country. The popularity of these institutions is due to a number of factors, including: ease of entry, low cost, the opportunity for a second chance, small classes, teaching-oriented rather than research-oriented faculty, occupational programs, the proximity of campuses to home, and a chance for students to try out college life with the option after two years to terminate or to transfer for additional education.

Washington (1970) reports a meeting of the National Association of Collegiate Admissions Counselors which discussed not only the reasons for the existence of community colleges, but the problems that they have in staffing, finance, and curriculum development.

Concerning the development of the community college Kintzer (1967) ascribed three basic principles: 1) an expanded low-cost education for an expanding citizenry; 2) greater diversity and flexibility in education; and 3) effective organization and substantial support at the local level. In striving towards its prime objective of quality programs for a diverse student body, the community college should 1) be available to all who may benefit from its programs, 2) pro-

vide guidance services to assist each student in the selection of a course of study, 3) provide occupational programs geared to community needs, 4) offer quality lower-division transfer programs, 5) require at least a minimum of general education for all degrees or certificates, 6) relate to and serve its entire community, 7) provide remedial courses and 8) maintain a high quality of instruction as its major goal.

Other authors who have dealt in similar general terms with the philosophy and purpose of the community college include Plummer and Richardson (1964), Alt (1968), and Eldridge (1967).

In the opinion of many, the community college has emerged as the most appropriate training agency for students entering middle manpower jobs that require a balance of cognitive and manual abilities. Harris (1967) suggested, however, that there is no significant knowledge available of such matters as 1) the real entry requirements of industry, 2) the extent and value of apprenticeship programs and other training programs conducted by industry, 3) the extent to which industry makes proper use of technicians, and 4) the effects of changing technology on job requirements.

Howard (1970) suggests that community colleges should offer a multiplicity of occupational programs so that all community college students regardless of background can find a program that is right for them. A conference held by the Southern Regional Education Board (1964) considered the most appropriate pattern for organization of post-secondary occupational education, and the need for adequate guidance, recruitment of qualified teachers, and the development of status for graduates.

Hall (1965) indicated that the community college occupational preparation functions include training for entry into the labor force, upgrading for advancement, and retraining for new requirements.

Proceedings of a state conference held in North Carolina focused on the rationale that providing more and better quality education for the world of work is vital for the country (Cone and Vario, 1967). This would provide employment opportunities for those who are unemployed or underemployed and an adequate force of well-trained technicians for business and industry. Doran (1969) discussed the problems of the coexistence of multiple levels of occupational programs in the same institution.

Planning for occupational programs in the community colleges has freely been based on an entire state. Although many such plans have been written and some indeed implemented, few have found their way into the literature. Gillie (1970) suggested a statewide framework for the organization of occupational education in Pennsylvania; and Selman (1966) studied occupational curricula for existing and proposed community colleges in Utah.

Even more frequent are reports prepared by individual colleges of the needs of their communities and the ways in which occupational programs at the community colleges can help to serve those needs. Garcia (1967) discussed the program and services of Modesto Junior College (California) for a rural area. Nakamoto (1967) proposed an educational development plan for the Kapiolani Community College in Hawaii; and the Citizens' League for Minneapolis (1967) re-

ported on the needs in occupational programs for community colleges in the Twin Cities area.

Other Settings

Despite the paramount position of the community college in occupational programs at the technician or middle manpower level, the community college has no monopoly of such activities. There are substantial numbers of programs for the training of technicians that exist in other kinds of institutions. Technical institutes that limit their offerings to technician training programs and usually only in engineering technology, have made substantial input. Branches and main campuses of four-year colleges also have been engaged in this kind of work for many years. Private proprietary institutions make a significant contribution. The armed forces train the majority of their own technicians and provide trained technicians for the private sector. Probably the largest input and one that is not easily measured, is that made by private industry.

Hoos (1967) discussed the activities of several San Francisco Bay area companies and their development of specific programs for upgrading and retraining and for providing placement opportunities for workers who are displaced because of industry fluctuations or rapid technology change.

Other Countries

The concept of the community college has been exported to other nations and is probably the only American educational innovation it has. Yarrington (1970) reported on the First International Assembly on Manpower Development sponsored by the American Association of Junior Colleges which discussed manpower needs and the role of the community college in meeting these needs in developing countries. Canada has copied this American institution extensively and modified it to meet its specific needs (Abrahams, 1969; Bissell, 1965; W. Davis, 1967; F. Kelly, 1967; Thomas, 1966; and Stannard, 1968). The development or desirability of community colleges in Great Britain is discussed by Eisenhauer (1968); in Santo Domingo by Green (1969); in Japan by Walker (1970); and in Malaysia by Harris (1970).

ATTITUDES TOWARD OCCUPATIONAL PREPARATION

Technology is applied organized knowledge which provides the support for the elaborate standard of living that exists today in the United States. This technology is developed and applied at a rapid rate. In the past, the educational system has been based on a concept of stability; the present general is the first which must educate its youth in a new dimension of time and change. There is less and less opportunity for the uninformed and untrained worker. More and more specialized education must be provided. Venn (1969) itemized the shortage of specified technicians and supportive workers and the apparent supply of educable persons to fill these vacancies. The National Advisory Council on Vocational Education (1970) presented its considerations of the federal approach to funding occupational programs at all levels. Testimony before the U.S. Senate Committee on Labor and Public Welfare (1969) concerning education and training for veterans, outlined both the need for and the extent of federal financial support in this area.

A conference on occupational education in the two-year college was held in St. Louis by the American Association of Junior Colleges (1966). In that report, Gleazer discussed attitudes towards occupational education, response to a changing society, effective utilization of technicians, and the improvement of communication among education, government, business, industry, labor, and the professions. Parker Wilbur dealt with administrative considerations in organization, the role of personnel, relationship of coordinators and teaching faculty, capital outlay, the use of advisory commissions, and public relations. Harris discussed the process of curriculum development, the relationship between general and technical education, student selection, faculty recruitment, and continuing education. Blocker, in speaking about student personnel services, discussed theoretical aspects, current practices, implementation and organization, and educational responsibilities.

The Colorado State General Assembly (1966) was charged to study Colorado laws pertaining to vocational education and youth employment. It reviewed publicly supported vocational education programs in the state and the administrative and organizational structure under which they were established. No single agency had been in a position to develop overall occupational education policy affecting all programs. There was a lack of adequate occupational education opportunity, especially in the public schools. The guidance counselors in public schools frequently lacked the necessary occupational orientation. The secondary schools seemed well suited for offering basic exploratory and introductory occupational education, but did not assume this function with enthusiasm. They recommended the following legislative action: 1) increased state support for secondary school occupational programs; 2) state support for occupational guid-

ance and counseling in the secondary school; 3) increased emphasis on post-secondary occupational programs, particularly in the community colleges; 4) the expansion of apprenticeship programs; and 5) the establishment of a new board to control both community colleges and the occupational education program.

For the small community college, decisions to train technicians may have to depend more on feasibility than desirability (Sietz, 1967). Although local industrial needs can usually be determined with relative ease, the college may not have the funds to introduce and maintain programs of sufficiently high quality to meet them. Even with increasing federal aid, the new or small institution has trouble meeting the high cost of facilities and equipment. It must also pay more for qualified teachers who understandably prefer colleges in larger cities because of prestige, fringe benefits, and such urban amenities as housing, recreation, graduate study, and consultant work. The cost of both plant and faculty will continue to grow and administrators concerned with quality must keep this in mind while considering new programs. Sietz described a three-level staging of the educational process—instructive, investigative, and inventive. The first phase is traditionally didactic and concerned with scientific procedure. The second or problem solving level presents the student with experiments of varying degrees of complexity to solve, and the third stage offers him problems with no known or complete answers. The technical program as a whole is judged by the success of its graduates getting and advancing in appropriate jobs.

STUDENTS

Entrance Requirements

Most community colleges operate with an open door admission philosophy. This is usually translated as meaning the college shall admit all persons, whether high school graduates or not, who could benefit by the instruction offered. This philosophy in the first instance gives the college the responsibility for developing a variety of curricula to meet varying backgrounds and interests of students. Secondly, some consider this philosophy an invitation for any student to attempt any course or any curriculum. Recently, however, a substantial number of administrators have felt that this means a student be admitted to a course or curriculum only if he has a reasonable chance of success. Accordingly, remedial, developmental, and pre-technical programs have been developed. These meet the needs of that group which does not have, at that point in time, such reasonable chance of success.

There is little literature that sets forth entrance requirements for students to occupational programs in community colleges, but there are a number of articles describing the competencies of students entering various occupational programs in community colleges, and some discussions of their success. This provides some basis for setting entrance requirements should these be necessary.

To determine the value of a non-credit pre-technical program for improving the academic competence of students with marginal qualifications for admission to technical curricula, Brodsky (1964) described an experiment involving 40 pairs of students matched on 1) high school grade average, 2) high school diploma type, and 3) type of engineering technician curriculum. The experimental group enrolled in a pre-technical semester, while the control group did not. Analysis of covariance with first semester technical curriculum grade point average as criterion and chi-square analysis with a criterion of academic status after the first semester, showed that the experimental group was sufficiently more competent than the control group. Brodsky identified a combination of factors which enabled reasonable prediction of academic achievement in technical curricula.

Middlesex County College (New Jersey) attempted to identify qualified youth with exceptional financial need to encourage them to complete secondary school and to undertake post-secondary occupational training within a community college (Samsel, 1968). In implementing the program, local business and industry were contacted for the purpose of creating interest among the personnel directors in the area. Through high school visitations, community organization contacts, and coverage by the news media, an estimated 13,500 citizens in a population of 500,000 were informed about the project activity. Counselor visitations to schools and planned campus visitations for interested industrial personnel, community organizations, students, and parents constituted the third phase of the project. The final phase was the preparation of synchronized slide-tape career presentations depicting requirements, curricula, and financial aid oppor-

tunities in the fields of chemical technology, electrical technology, laboratory technology, business education, secretarial science, and nurse education.

Grossmont College (California) (1967) reported on its efforts to provide high school students with information about the new technologies and to stimulate interest in college attendance. Results of a pre-college seminar, which operated as if it were a professional conference, indicate that a general education course in technology can provide information not otherwise available to high school students and that it can encourage them to enroll in college.

Eberley (1969) studied the predictive power of the General Aptitude Test Battery (GATB) for the junior college student for whom the traditional measures of ability may not be suitable. The study was designed to see if GATB would predict grade point averages for first semester freshmen in both transfer and vocational programs. Three hypotheses were tested on 203 transfer and 88 vocational students. The pertinent findings were that certain portions of the complete battery were fair predictors of academic success for freshmen entering a transfer program and that they are less successful predictors for the entering vocational student. It is implicit that when two scores are combined for the transfer student a respectable predictive validity results. Validity for the vocational student was low. Further research is needed to isolate more homogeneous career fields if GATB is to be helpful for the vocational student.

In his study, Phillips (1968) identified certain differences and similarities among entering technician education students at four post-high school institutions. Data were collected on personal and social characteristics, socioeconomic background, and scholastic aptitudes from 724 students. The researchers used two standardized instruments, the Nelson-Denny Reading Test and the Technical Scholastic Test, and a questionnaire designed to obtain the personal data. It was concluded that 1) technical education students make curricular choices with only limited knowledge of available programs and institutions; 2) they tend to express unrealistic educational objectives; 3) they have had limited contact with high school counselors; and 4) their reading scores tend to be lower than norms for college freshmen.

The American College Testing program developed questionnaires, checklists, and procedures designed to express in quantitative terms the characteristics of students and the junior colleges that they attend. (Braskamp and Richards, 1967.) Since correlations among student and college characteristics were low to moderate, only very broad conclusions could be drawn. Colleges scoring high in conventionalism, high cost, and private control factors tend to attract more talented and intellectually oriented students than do colleges rating high in technological specialization. Large colleges typically have more varied enrollments than do small colleges. Colleges scoring high in transfer emphasis attract students from a wide range of academic potential. Variation among students in colleges with high transfer rates suggest that the college experience may be more important than the characteristics of the entering students in the determination of transfer ratings.

M. Crawford (1966) reported on the measurement of individual traits and separate factors of intelligence, followed by empirical combination of these measures into aptitude test batteries as a basis of selection of students for occupational preparation. Los Angeles Trade-Technical College (California) has devel-

oped and validated such test batteries for some 55 curriculums and tests over 8,000 applicants annually. The student selection process involves both the testing program and applicant-counselor-instructor interview. Validity studies made on the aptitude test battery and those tests found to have significant correlation for prediction are listed.

A test battery was administered to all entering freshmen at Bronx Community College (New York) in the fall of 1965, in order to determine their effectiveness in predicting or explaining student choice, performance, and persistence in representative career programs (Davis and Linn, 1966). Grade averages and scholastic aptitude test scores were also compiled. Analyses of data were made separately for students in transfer programs and for those in career programs. For each group of students, the mean, standard deviation, and intercorrelation were computed for the 32 predictor variables and the two criterion variables. Though traditional predictors of academic success were not expected to be particularly useful for students in career programs where the goals and criteria of success are different from those in more traditional college programs, they were found to be almost as reliable here as they are in predicting success at many four-year colleges.

Further studies describe the aptitudes of community college business education students (Whitfield, 1969) and the prediction of grades in occupational and academic curricula in two-year colleges (L. Baird, 1969).

Student Characteristics

There are many excellent studies of characteristics of students in occupational programs in community colleges. Some of the more significant of these studies are summarized below.

To identify certain characteristics of those students in occupational programs, Hakanson (1967) studied 1,000 students who entered six public community colleges in the fall of 1959. The emphasis was on socioeconomic background. Of the 319 students who had spent some time in occupational programs, most enrolled in such programs directly following high school graduation rather than as a result of lack of success in transfer programs. Most, especially women, had taken occupational courses in high school. Sixty percent did not complete the program in which they enrolled. Most enrollments and completions were from the middle socioeconomic level. Although only 14 percent of those who failed to complete transfer programs changed to occupational curriculums, almost one-third of male occupational students with middle socioeconomic status had tried a transfer program before enrolling in an occupational program. Hakanson concluded that low and middle socioeconomic groups are more likely to complete occupational programs than are high status groups. The colleges are failing in an important function of helping academic program failures to reassess their goals rather than withdraw. The colleges should recruit more high school graduates directly into occupational programs. Students must be brought to a better understanding of their aptitudes and limitations and of their own responsibilities for the extent to which they commit themselves to chosen courses of study.

American College Testing scores earned by Glendale College (Arizona) technical students were compared with those of the college's populations as

a whole (Frost and Spector, 1967). The scores of technical students tended to be lower in English and social science, about the same in natural science, and higher in mathematics than the scores of the overall population. The low social science and English scores suggested that the technical students had a general basic deficiency in language development. Technical students appeared to need special help in English or a program designed especially to aid them in meeting the English requirements for the Associate degree. The range of mathematics scores suggested that some technical students need remedial assistance in this area.

Larson (1965) reported observations on the characteristics of students, teachers, and curricula in the technical programs of Michigan junior colleges. All of the students were male, 74 percent were under 21, 54 percent were district residents, 60 percent were from families with non-professional backgrounds, 52 percent worked part-time, and 22 percent full-time while in college; 39 percent would choose the same occupation again, most were satisfied with the counseling service, except for job placement; 31 percent wanted less theory and more practice; 39 percent believed the college helpful in getting them a job; 50 percent were satisfied with their job, although only 35 percent were doing curriculum-related work.

Erie County Technical Institute (New York) (1968) issued a report designed to inform its faculty of certain student attitudes. Of the 2,409 students registered in September 1966, 1,982 responded to the questionnaire. Sixty percent said that they were in the program that most interested them, while 222 were not and 378 were undecided. At the time of enrollment, 141 had been uncertain about their plans. Fifty percent chose their program to train for a good job; 16 percent wanted a degree of less than four years; 21 percent felt unqualified for a four-year college. Only 35 wanted to postpone military service. The most influential recruitment factors in order of preference were: 1) high school counselor,2) college counselor, 3) parents or other adults, 4) friends, and 5) brochures, etc. available from counselors. Factors of little influence were: 1) college and career days in high school, and 2) mass media, such as mailings, newspapers, posters.

Stewart (1966) reported on characteristics of community college students in occupationally oriented curricula. Two inventories, the Interest Assessment Scales (IAS) and selected scales of the Omnibus Personality Inventory (OPI), and a background questionnaire were administered to community college students enrolled in occupational courses. Among the non-cognitive variables compared were source of life satisfaction (job, marriage, family, leisure, and religion), risk taking attitudes, impulse expression, estheticism, and abstraction. Meaningful psychological factors were found to be related to the choice of an occupational program.

The students were not an aggregate of individuals who are in vocational programs because they had been unsuccessful in other courses or because they had been judged unable to complete an academic course of study.

The study was extended (Stewart, 1969) to include 2,459 individuals enrolled in occupation-centered curricula in California community colleges. The relationships between responses to selected questionnaire items and scores on the Interest Assessment Scales and Omnibus Personality Inventory showed that 1) a widespread difference in age exists among students in various curricula; 2) the

IAS was more effective than the School and College Ability Test in classifying students according to their choice of curriculum; and 3) IAS and OPI correctly classified the following percentage of students according to: perceived high school achievement (IAS-28%, OPI-30%); job risk preference (IAS-40%, OPI-44%); and highest sources of life satisfaction (IAS-18%, OPI-24%).

To determine what factors influenced their enrollment, Hawthorne (1970) administered a questionnaire to 167 male students enrolled in occupational programs at Daytona Beach Junior College (Florida). The typical student was a high school graduate, white, and between 20 and 21 years old. In addition, he appears to have had some work experience, a definite occupation goal, and some degree of self-support. Subjecting student responses to the chi-square test for statistical significance at the .05 confidence level, indicated that 1) career choices are firm, 2) the most desirable job characteristic is the security, 3) self-employment aspirations were reported more often by non-high school graduates, and 4) school problems faced by black and by white students differ.

Lunneborg (1970) reported research indicating the necessity for predictive criteria other than grades to aid the community college student in making decisions concerning careers and goals. Three studies demonstrated that unless there is a close correspondence between predictors and criteria, the available tests are able to predict only grade success. As a result, a search is being made for criteria and predictors which will be useful in attaining fore-knowledge of personal growth and satisfaction with the college experience.

Findings of recent studies about community college students enrolled in occupational programs are reported by Cross (1970). She developed a tentative description of their background and characteristics and compared them with students at other institutions and in other programs. The typical environments from which these students are likely to come were described. The implications of such socioeconomic factors as differences in fathers' education and occupation level were reported. Ability levels and their relationship to program or type of institutional attendance were viewed. Comparisons were made between high school courses of study and academic self-perceptions. She concluded with a look at the occupationally-oriented student's interests, goals, perceptions of educational aims, and motivations.

Hilleary (1966) studied the characteristics of students enrolled in business data processing classes at Los Angeles Metropolitan College (California); and Turner (1966) reported on the differential identification of successful technical students.

Enrollments

Although most colleges undoubtedly collect data on the number of students that enroll in various occupational programs, these reports do not, as a general rule, end up in the literature.

CURRICULUM

General

College catalogs serve as the best source of information concerning the curricula that are offered at specific colleges. The curricula have usually been devised through internal studies at the particular institution. There exist some general articles on occupational education as guides for such studies.

New approaches and technological innovations will be required by the community colleges to meet the increasing educational needs for technical occupations (Mills, 1968). There must be sufficient information available on which the prospective student can base an intelligent choice of occupation. For this, he must have a precise job description to determine whether the career fits his abilities and interests, and whether the training required for it is within his time and money limits. This information must be acquired not only from standard sources, but also directly from industry, so that it will be accurate and up-to-date. The second need is for instructional material at an appropriate level of college specialization. This, too, should come to some extent from business and industry, probably best through advisory committees for various job clusters.

Discussions held at two workshops at Michigan State University and the University of Florida were designed to assist community colleges in developing and selling the idea of well rounded occupational curricula (Menefee, 1969). The discussions included planning for occupational education, role of advisory committees, community involvement, and cooperative education programs. The workshops also dealt with the major developments in specific occupational areas, reports of the colleges on their own outstanding programs, and consideration of new approaches, new trends, and necessary ingredients in occupational education.

Using data gathered from North Carolina community colleges and technical institutes, Fearn (1969) studied the major factors determining curriculum mix. The study tested the hypothesis that local labor market structures influence curriculum offerings and that budgetary allocation procedures within the educational system create internal monetary incentives which affect curricular offerings. Least squares regression analysis indicated that curricular offerings were positively related to absolute size of the employing industry, but negatively related to its relative size. Curriculum mix is affected by the local administrators' budgetary allocations. This can result in a drift in curriculum from optimality towards a position more profitable to the local administrator in terms of budgetary considerations.

Brandon (1960) developed a matrix model for demonstrating the relationship of specific concepts, skills, and courses to various technical occupations. This was accomplished by collecting occupational analyses data and related publications, critically analyzing the collected data and conference discussions concerning the results, and determining the strategic research design for studies across the entire field of occupations for technicians.

Data for a report on the status of and need for technical programs in the community colleges was obtained from a questionnaire mailed to all public community colleges, catalogs and bulletins of selected colleges, and literature in the field (N. Smith, 1966). A 52 percent response indicated that 70 percent of the institutions offered technical curricula in 1966, an increase of 134 percent in a decade, as compared to 45 percent growth in the number of two-year colleges. The factors most frequently cited as incentives were: interest by industry, interest by students, and state or federal financial aid. The most evident problems were the lack of effective vocational counseling and the loss of credit when transfering to other curricula.

H. Davis (1970) prepared a 165-citation bibliography of innovations and new curricula in two-year colleges. Maner (1970) presented a synthesis of selected literature on community college public relations with emphasis on occupationally oriented programs. Blocker (1968b) discussed the needs of community college librarians as these are reflections of the occupational programs in the community colleges. Giles (1963) reported on a conference designed to inform prospective employers of current trends in technician education. The Manpower Development Corporation (1970) developed in North Carolina a model useful in planning national manpower policy. Pine (1965) studied the needs for post-secondary occupational education in Michigan.

There are frequent references to studies of the needs in a particular district. Pickett (1966) has done so for Eastern Iowa; Erskine (1966) for Macomb County, Michigan; Rogers (1966) for Quincy, Massachusetts, and Parkersburg, West Virginia; Dodge (1967) for Goshen County, Wyoming; Shively (1967) for Beverly, Massachusetts; Kuhns (1963) for Montgomery County, Maryland; Kleis (1967) for Muskegon, Michigan; Bessire (1965) for Shasta, California; and Johnson (1969) for Lowell, Massachusetts.

Specific

The largest single number of literature references relate to specific curricula. In the sections that follow, important reports are described. The classification is frequently arbitrary.

Engineering and Science-Related

This area is frequently called "technical education" without further qualification. Schill (1964) discussed curriculum content for technical education. The technician is not a retrained draftsman nor a flunked-out engineering student. He is a new and unique aspect of technical society. Three levels of technicians are described: the engineering technician, the industrial technician, and the technical specialist. There is a large gap between abstract engineering and production; the technician should help bridge this gap.

The current shortage of technicians and industry's preference for trained personnel serve as mute evidence that current and past practices of determining curriculum content are less than satisfactory. The basic instrument used to collect data was a modified version of the Q-sort. Cards were developed to represent the content of courses taken by technicians in preparation for various jobs. Assessing the educational attainment of the respondents helped to classify some of manage-

ments viewpoints concerning hiring practices. Some high school programs are good, but the traditional college program with its emphasis on science and mathematics is more in line with the needs of technicians' positions. Analy. were used to identify the core program and specific areas of knowledge related to the separate technologies. The core program knowledges included technical writing, engineering graphics, mathematics through trigonometry, and the use of test equipment.

A technical education workshop was held at Los Alamos, New Mexico, for industrial representatives and technical educators (Hardwick, 1967). They defined a technician as one with broad-based mathematical and scientific training and with competence to support professional systems, engineering, and other scientific personnel. He should receive a rigorous two-year post-secondary education, especially designed for his needs. Industry members agreed that he must understand the total manufacturing process in his industry, be able to communicate well and learn new data handling processes when necessary, know scientific method in general as well as his specialty, have a solid background in pertinent mathematics, and have a general ability to work with both the tools and theory of his particular industry.

Dobrovolny (1967) suggested a two-year six-quarter post-high school program in electronic technology. He described the philosophy and objectives of the faculty and students. He presented the curriculum in detailed course outlines for all phases of the program and for the supportive studies in mathematics, physics, drafting, and the like. The report included suggestions for the laboratory, its equipment, probable costs, and several workable floor plans for facilities.

Barlow (1962) studied the role of mathematics in electrical-electronic technology. The study was concerned with the determination of the kind of mathematics the electronics technician worker actually used or needed to have knowledge of on the job. Data were gathered from 90 technical workers selected at random from 44 randomly selected electronics companies, and 229 instructors selected at random from 45 colleges with electronics programs.

The methods of collecting data were individual interviews in which personal data and job history were collected, and Q-sorts which determined mathematical concepts or skills needed to perform on the job. The Q-sort was a means of getting the technical workers to distribute into nine different categories 66 mathematical problems according to the extent to which these problems were characteristic of their day-to-day work. Mathematical skills or concepts found to be essential to electronics technical workers in research and development were: conversion of fractions into decimals, calculations of tolerance, changing percentages to decimals, conversion of metric to American measuring system, square root long-hand method, division of signed numbers, scientific notation, estimation of arithmetic problems, multiplication with exponents, division with exponents, raising to a power with exponents, use of negative exponents, ratios, and Pythagorean Theorem.

Husung (1969) studied the effects of automation on the nature of the work of the draftsman in industry and innovative programs of instruction for automated drafting in selected colleges. Visits to 35 industries and professional offices and interviews of 219 draftsmen and supervisors were conducted to deter-

mine the effects of automation on the needs of industry for draftsmen with general versus specialized training and the curricular revisions in drafting programs to meet the needs of automation. A questionnaire was sent to 87 colleges to identify the general nature of their drafting programs, which colleges were using computer-assisted design, and which colleges had an established program in architecture, engineering, and production. Visits were made to the most innovative colleges and instructors were interviewed. The conclusions were: there is very little need for skills or knowledge regarding computer-aided drafting at present; automation is not greatly influencing the needs for draftsmen; numerical control machining operations had little effect on the draftsman's work; more emphasis should be placed on curriculum content; and teachers of drafting should relate job descriptions to their students.

Dobrovolny (1968) reported discussions held at a civil engineering technology consultants workshop in Atlanta, Georgia. The purpose of the workshop was to orient the consultants to recent developments in civil engineering technology and to their responsibilities in program development. The report is intended as a guide to consultants and as an introduction to civil engineering technology for college administrators. A consultant could be used by colleges in conducting meaningful manpower needs studies to determine the feasibility of instituting a program in civil engineering technology. If such a decision is made, a consultant could assist in selecting a competent individual to serve as head of the department. This individual would then be responsible for developing the curriculum, staff, and facilities through the involvement of consultants and a local advisory committee. The two-year program in civil engineering technology should include an integrated sequence of educational experiences, with a distribution of approximately 19 credit hours in basic science courses, 15 credit hours in non-technical courses, and 38 credit hours in technical courses. The objectives of the program will determine the requirements for faculty, laboratories, potential student population, and other program facets.

Ternstrom (1968) reported on a program to train architectural technicians. Architectural technicians translate design and systems solutions into graphic and written form and assist in rendering architectural services. A study group of the American Institute of Architects found existing two-year programs inadequate, falling into one of two categories, either drafting programs which lacked breadth and failed to provide background in mathematics, applied science and modern building techniques, or programs similar to the first two years of orthodox pre-professional offerings with inadequate technical emphasis and little preparation for immediate employment. The community college is particularly suited for offering programs in three areas: 1) drafting, specifications, and estimating; 2) graphic arts, models, and reproduction; and 3) administration, data processing, and information. In this description, attention is given to curriculum, students, faculty, and continuing education.

A Conference on Chemical Technicians (1967) at New York City Community College reported on curriculum development and student recruitment in that field. The report dealt with USOE's suggested curriculum, the American Chemical Society's recommendations, and the implications of these curricula on the use of technicians in industry. There was discussion of the relationship of the scientific assistant to the professional scientist, and the need for greater dissem-

ination of materials in an effort to recruit more and better students into the field.

The American Chemical Society (1968) reported another conference on utilization and education of chemical technicians. Processes and equipment have become increasingly more sophisticated; accordingly, industry is seeking chemical technicians who have developed an academic and experience base which exceeds that being provided by high schools. The conference was an effort to improve both the quality and quantity of programs for training chemical technicians. Several presentations concerning the role and function of the chemical technician in industrial research and production, the curriculum content and institutional role of chemical technician education, and the role of educational institutions and professional associations in programs of continuing education for the chemical technician were included.

The Society of Plastics Engineers (1968) discussed the need for plastics education. In view of a lack of trained personnel in the industry, they proposed that educators add more plastics programs, establish plastics engineering degrees at appropriate four-year institutions, add plastics processing technology to current engineering curricula, and interest younger students in courses and/or apprenticeships. A questionnaire sent to over 4,000 firms showed a serious and growing shortage of mold and die makers, supervisors, mold set-up technicians, product designers and draftsmen, cycle and material technicians, quality controllers, processing and finishing specialists and color and mixing specialists.

In his discussion of science education in the community college in general terms, Eiss (1966) suggested new approaches to physical and general education science, technical education, and biological and physical science laboratory programs.

Blocker (1968) projected the role of the community college in the development of scientific manpower. The labor force in the 1970's and 1980's will call for proportionately more service workers, clerical personnel, and professional and technical workers. Increasing percentages of women in the labor force will continue during the last half of the twentieth century. Implications for community colleges are inherent in such developments. Along with the demand for additional post-secondary training, has come a rapid increase in college enrollments. Typically, community college students are less bookish and read less than do university students, are from lower income families, and tend to make vocational and educational decisions later than those who attend four-year institutions.

With the sudden growth of post-secondary institutions, a critical and growing shortage of professional personnel has appeared, particularly in engineering, business education, psychology, and vocational subjects. Not only must more teachers be recruited, but more teachers must be obtained who understand the characteristics of the students they are to teach, the institution's function, and the teacher's adjustments necessary for effective functioning within the organization.

Wiens (1963) presented a basic course in nucleonics. The combined teaching and study guide is for use by students and teachers in post-secondary programs for nucleonics technicians. He included the following topics: physics of the atom, natural radioactivity and atomic energy, induced radioactivity and atomic

energy, radiation safety and radiation doses, Geiger-Mueller counters, determination of half life, absorption and backscattering of beta rays, absorption of gamma rays, resolving time of a counter, calibration of a counter, statistical variation in radioactive measurements, range and energy of alpha particles, effect of magnetic fields on beta and gamma radiation, comparison of various counters, radioactive fallout, tracer techniques, and cloud chambers. Each unit includes objectives, introduction, teaching plan, apparatus required, text materials, study questions, and a bibliography.

Planners of programs to train nuclear technicians have problems such as: lack of precedent in curriculum, course outlines, and graduate placement; difficulty in determining costs of laboratory construction, equipment, and operation; and the requirements of Atomic Energy Commission licenses in nuclear occupations (Kovner, 1967). A program developed at the community college division of Old Dominion College (Virginia) combined nuclear courses with a strong base in electronics. The program is open to high school graduates who have completed elementary and intermediate algebra, plane geometry and chemistry. It includes English and technical writing, mathematics, physics, electricity and electronics, nuclear studies, and other technical courses.

Kohr and Wolfe (1966) described an experimental program in engineering and design data processing technology. Of the first class of 26 students, 17 completed the program and 12 were employed as computer programmers, eight of whom worked in business rather than in scientific applications. A follow-up study showed the need for providing business courses and instruction in business-oriented computer language, plus some work with a high-speed printer and magnetic tape or disc storage devices. The report includes course descriptions and sequences for both the scientific and business programs.

In order to determine the need for training of photo-optics instrumentation technicians, Cooper (1964) conducted personal interviews in 100 firms and agencies manufacturing or using such equipment. He determined that the training needed could suitably be provided at the community college and that costs would not be prohibitive. Specific subject areas required for training included: mathematics through trigonometry, drafting, physics, optics, photo processing, basic electronics, and mechanical assembly. Employment potential is estimated at 450 in the state of California, with over 600 additional needed in the next five years.

Fribance (1965) reported on a summer institute held for prospective teachers of industrial instrumentation. The program was evaluated by the trainees and by an external committee. The results indicate that a summer could be used effectively to prepare prospective industrial instrumentation teachers.

Chan (1968) reported a study of the need for marine technicians in California, implications for the national scene, and observations made at a conference held in Florida. Problems treated are: definition of a marine technician, how marine technicians should be classified, how great is the need for them, the type of work they do, what skills and training they need, their pay scale, women as marine technicians, how a community college educates and trains marine technicians, which community colleges are now doing so, the financial support available, and the type of evaluation that should be established.

Teel (1966) reported on the need to establish a marine sciences technology program at Shoreline Community College (Washington). Tolonen (1965) reported

on the feasibility of establishment of an associate degree program in marine technology at Clatsop Community College (Oregon).

The Cessna Aircraft Company (1966) described an aviation course for junior colleges. The course is in two parts: part one covers flight principles, aircraft operation and performance, navigation, the flight computer, radio guidance and communication, weather, flight information publications, federal aviation regulations, the airway system, flight instruments, and flight planning; part two includes history of aviation, aviation today, aviation and the individual, and the government in aviation.

Finch (1969) summarized the major conclusions of the Aviation Briefing for Community Colleges which met to establish dialogue between community colleges and the aviation industry. The discussions included an overview of community college aviation, a survey of community college aviation programs, and the suggestion that communication among schools and between industry and education be improved.

Ryan (1967) described the need of the aerospace industry for technicians trained in community college, and Thomason (1966), the need for aviation-oriented technical personnel in the southwest.

A program developed at the Fayetteville Technical Institute (North Carolina) focused on sanitary engineering technology (Boudreau and Purcell, 1964). An advisory committee helped to determine the need for such graduates, the best courses for the curriculum, and the necessary facilities. The student learns standard laboratory and testing procedures for waste, food, and water handling in many areas of sanitary engineering and public health. He also takes related courses in water and waste treatment, sanitation control systems, and plant maintenance. Graduates may find employment as public health or sanitation aides, treatment plant and water plant operators, stream sanitation technicians, industrial waste technicians, technical equipment and chemical sales or service personnel, and engineering technicians in government agencies.

Turner (1970) described the development of an air pollution technology program at Santa Fe Junior College (Florida).

Snepp and Woodin(1965) and McCollum (1966) studied agricultural offerings in community colleges throughout the United States. Rapid change in agriculture requires that today's agriculturalist be a well-educated, articulate technician. Community colleges can contribute by offering specialized agricultural technician training, both for those entering the field and for those wishing to update their knowledge and skills.

The need and type of training program required for agricultural public service technicians was the subject of a study by Mount San Antonio College (California)(1963). Over 51 different kinds of jobs existed for technicians with two years of training. Employers recommended instruction in fertilizers, pesticides, insecticides, chemistry, standardization, vertebrate pests, soils, botany, weeds, truck crops, and agronomy. Rodrigues (1967) dealt specifically with training needs in agriculture in Ventura County (California); Orum (1965) noted the need for such training in Yuba College (California).

Factors that lead to the development of a program to prepare students for employment in occupations related to the use and conservation of natural re-

sources are: 1) the consistently large number of students who enrolled in transfer programs in these fields but who did not continue beyond the junior college; and 2) the location of the college in an area of high employment and interest in these fields (Brooks and Dubose, 1967). A survey revealed those jobs for which a generalized major in natural resources would be appropriate are forestry aide or technician, fish and wildlife assistant, fish culturist, game warden, range technician, and refuge foreman.

There is a need for the education of technicians in the area of forestry, recreation and wildlife (Whaley, 1965). In this study, questionnaires were administered to selected representatives of the forestry, rural recreation, and wildlife management fields. The anticipated number of full-time placement opportunities for the 1970's was about 215 technicians in forestry, 75 in rural recreation, and 20 in wildlife management. General education abilities in communication, applied mathematics, personal management, technical drawing, sketching, and map and blueprint reading were generally rated very important for technicians in the three areas. It was concluded that there is a definite need for people trained at the technical level and that the junior college can offer needed instruction.

R. Matthews (1968) developed a curriculum guide for landscape installation and maintenance. Giuffrida (1970) examined an unusual career-oriented program, art glass technology at Corning Community College (New York).

There are scattered references to curricula for skilled craftsmen at community colleges. Central Carolina Technical Institute (1970) reported on a new approach to teaching auto mechanics; Haywood Technical Institute (1969) on a program to train sawyers, saw filers, dry-kiln operators, and lumber graders; Orum (1965) on welders; and Schauer (1966) on programs for appliance service technicians.

Programs Related to Business

In all probability, the largest enrollment in any area of occupational programs in community college is in business-related fields. These programs have been in existence for a long time and are well distributed over all community colleges. There is comparatively less literature in this field than in other newer fields.

Goddard (1967) analyzed the relationship between trends in community college education in general and education for business in particular. In response to community requirements, the college administration can choose and develop course offerings such as a program on basic needs of local business and industry, a terminal vocational program for the semi-professional with enough general education to avoid over-specialization, a transfer program which includes business and economics background courses, business and economics courses in the general curriculum for the student's personal use, or courses for re-training or updating those already employed or who are wishing to re-enter the job market.

Curriculum objectives of community college business programs defined by Griffits (1967) include transfer, technical, semi-professional, supplemental, re-training, developmental, opportunity, and vocational. He concluded that technical and semi-professional objectives would become as important as the transfer

objective in community college business programs. Programs to provide appropriate occupational training for adults will increase. Adequate occupational training programs for low ability adults will not likely be provided. Business department heads are unable to effect appropriate programs when the pervading institutional philosophy is traditional and conservative; a real problem is the inability of colleges to use advisory boards effectively or to employ consultants in curriculum development.

Trapnell (1967) developed a guide for distributive education programs in the junior colleges. She dealt with program organization, admission requirements, basic components of the mid-management program, program operation and administration, program promotion, and evaluation.

The Texas Education Agency (1968) reported on a conference held to share ideas and experiences relative to post-secondary curricula in office education. Topics included; traits an office manager longs for in an employee, individualized instruction and procedure, problems in teaching students with a language barrier or difficulty, and problems in teaching students with less ability.

Goodman (1970) discussed the preparation of individuals for technical careers in journalism; Piserchio (1969) the needs for technical secretaries; and Randolph Technical Institute (1970) an occupational art and technology design program.

The data processing technician's need to be competent in systems applications and methods was considered in Luskin's study (1967). Recent trends have emphasized computer technology with unit record equipment used only as support. Programs in data processing must include both theory and application, with breadth to provide a basis for later advancement and specialization. Luskin also described a sample program in this study.

In the area, Clark and Tilton (1967) commented on data processing curricula related to third generation computers; and Fedrick (1968) described how this has been integrated into a curriculum for El Camino College (California). Schmid (1970) and Weber and Greene (1969) spoke generally to the role of community colleges in education for data processing.

Almarode (1967) reported concerning community college programs to meet the needs of students and the hospitality industry. Before developing such occupational programs, the college should survey local industry needs, opportunities for on-the-job-training, possibility of part-time work for needy students and availability of instructors and advisors from industry, trade associations and unions. If the survey shows the program to be feasible, an advisory committee should be established to inform the college of industry's present and changing needs, to help select and counsel students, to assist in job placement before and after graduation, to assist the school or the student financially, to recommend essential curriculum content, to provide or help to recruit faculty, and to help publicize the program. The report offers examples of workable curricula for one-year certificates, two-year degree programs, and for transfer to four-year colleges.

Regarding manpower, Lloyd (1968) reported such training needs in the hotel-restaurant industry on Kauai, Hawaii and recommended programs, sources of students, instructors, and funds. Batmale and Mullany (1968) described career training in hotel and restaurant operation at the City College of San Francisco.

Haynes (1968) produced guidelines for supermarket management programs in the community colleges. Unprecedented growth and technological advances in the food industry have created a need for well trained supermarket management personnel. The community college is able to fill this need by offering sound one and two-year career-oriented programs. The report contains suggestions for developing these programs, including guidelines for surveying the community, selecting an advisory committee, setting program objectives, possible curriculum patterns, faculty recruitment and selection, recruitment of prospective students, dissemination of program information and public relations, funding, and program evaluation.

Allied Health Occupations

The development of programs for the preparation of personnel in the allied health fields has generated much interest and a substantial amount of literature.

Kinsinger (1966) gave an overview of education for health technicians. Health service technicians are normally prepared for entry into their occupations by pursuing post-secondary educational programs that do not demand a baccalaureate degree, but usually include a combination of theory, practical knowledge, manual skill, and the appropriate actual clinical practice. Problems of standards are gradually being resolved through legislation and licensing requirements; however, there is still wide disparity in depth and breadth of training programs. Defects in many college programs are continuing and will require closer analysis and attack by cooperating physicians, dentists, technicians, and educators.

In a combined study, Kinsinger and Ratner (1966) reported on the community college health careers project in New York, a five-phase program to develop curriculum guides and recommendations for instructor training based on a statewide survey. Objectives, and required knowledge, understanding and skills are described for eight technical health related occupations.

The implications for the pursuit of health goals in the 1970's will determine priorities in technical education (Teeple, 1968a). Teeple outlined factors basic to increasing the national emphasis on health care in the 1970's which reveal that an increased demand for health services and changes in the health field and health occupations will affect the supply of health manpower. The following priority for planning and research was suggested: 1) program development for non-professional health occupations; 2) expansion of associate degree nursing and practical nursing programs; 3) increasing the representation of left-out groups in health occupation education; 4) closer coordination between vocational education and community health centers; 5) offering core curricula in health in the eleventh and twelfth grades; and 6) cooperation between vocational educational and public and private agencies to assess local manpower situations.

Two bibliographies of articles by Frederick (1970a,b) provide background for health occupation programs in the community colleges.

Related to this, the American Association of Junior Colleges (1968) issued proceedings of a symposium on para-medical education and career mobility which explored the concept of the core curriculum and examined new avenues of approach to problems of health manpower shortages.

Problems in para-medical education include the administrative organization of associate degree nursing programs; steps in developing para-medical programs; advisory committees; relationships with professional agencies; sources of students; determination of need for programs; and program acceptance and approval (Skaggs, 1966).

Kahler (1967) prepared a guide for health technology program planning. This lists certain necessary pre-conditions before the course should be established. The administration must define the scope of the program, be aware of accepted standards for technicians in the field, note the possible impact of the program on the college's existing goals, discover by survey the particular program most needed by the community, be sure the development of the program is feasible, determine the resources needed, develop the curriculum, and establish procedures for continuing evaluation.

The health service occupational needs of particular regions have been reported: for Connecticut by Lownds (1967); for Virginia, by McGlothlin (1965); for Massachusetts, by the Training Center for Comprehensive Care (1967); for Harrisburg, Pennsylvania, by Ratner (1966); for St. Louis by the St. Louis Junior College District (1968).

The most popular health related program is that of nursing. The National League for Nursing (1967a) issued a significant statement to guide educators in this field. In 1965 the League adopted a resolution encouraging the orderly movement of nursing education into institutions of higher education. In 1967, the League adopted a new statement affirming that transference of nursing education programs from hospitals to educational institutions should take place after determination that the educational institutions can prepare at least as many graduates as the hospitals, and after community planning has assured that the resources of the new program will be adequate for quality education. There must be a greater proportion of professional nurses to technical and vocational nurses and a better balance between these groups and auxiliary personnel. Action to be undertaken includes: expansion and development of educationally sound associate degree and baccalaureate programs, and assistance to all programs in faculty improvement, student recruitment, and curriculum guidance.

Nursing education in the junior college has expanded rapidly in the 1960's (Gaddy and Roueche, 1969). Nursing programs at the junior college level are both adequate for and attractive to those who would not otherwise pursue a nursing career. Graduates are employed as full-time hospital staff nurses, remain with their first job for about one year, find their preparation and work orientation adequate, and plan to remain in the profession.

The National League for Nursing (1968, 1969) prepared two selected bibliographies on associate degree nursing programs and nursing education in junior and community colleges. The League (1967b) also published proceedings of a conference on criteria for quality in associate degree nursing programs.

Similarities and differences in 16 associate degree nursing programs at New York State were identified by Kinsinger (1964). A wide variation in enrollment patterns, class and laboratory hours, student-faculty ratios, teaching loads, and curriculum balance exists between general education and nursing courses. Proponents of strong general education foundations believe in altering curricula

to include 50 percent general education, 25 percent nursing, and 25 percent supportive courses. A distributive table to required and elective subjects is given.

The success in their offering of an associate degree nursing program was reported by the Chicago City College (1968). Malone (1968) reported on nursing education in Massachusetts; and Tomlinson (1968) evaluated practical nursing in Illinois.

The American Association of Junior Colleges (1966b) issued guidelines for the development of programs for the preparation of medical record technicians in junior colleges. The following factors were discussed: technical course content, faculty, affiliated accredited hospitals, organization of program curriculum recommendations for non-technical courses, supervised learning experience, and suggestions for planning. The program director should be a registered medical record librarian; a ratio of one professional faculty member to each 10 or 12 students is recommended. Suggested courses include English, anatomy and physiology, medical terminology, medical record science, typing and secretarial practice, mathematics, and machine transcription.

The American Association of Medical Record Librarians (1966) issued a set of guidelines for the development and operation of approved programs to prepare medical record technicians.

The role of junior colleges in educational programs in radiologic technology has also been studied (Soule, 1967). Recent reports indicate that there are presently 72,000 people operating X-ray equipment in this country, of whom 33,000 are registered technicians. It is estimated that by 1975 there will be a need for 100,000 technicians, of whom at least 52,000 should be fully trained. Almost all formally trained technicians are being prepared by the 1,200 hospital schools approved by the American Medical Association. These provide courses 24 or more months in length; 90 percent of them are terminal, without college affiliation. There are approximately 60 colleges, mostly community or junior colleges, which offer associate degree programs in this field.

Marshall (1968) described many aspects of a Radiation Health Technology Program at a lower division college level. Such a program should include certain basic courses, plus supplementary courses to meet the needs of local employers. To implement and sustain a curriculum, the college must determine the need for it, establish its objectives, develop course sequence and content, decide on necessary facilities and equipment, draw up a budget, obtain financial support, hire instructors, and recruit students. The instructors should be chosen for teaching ability, as well as technical experience. Employers' evaluation of the program should be continuing.

The Public Health Service (1966a) reported on a national conference on X-ray technician training. The discussion centered on what it will take to provide adequate numbers of appropriate qualified operators of X-ray machines in medicine.

The California State Department of Education (1966) surveyed dental assisting curricula in California junior colleges. Trends noted include an increase to a four-semester program with increasing emphasis in the first semester on ethics, professional organization, grooming, and terminology. The average time allotment was 1,086 hours per student, including 179 in biological science, 221 in

physical sciences including roentgenology, 181 in chairside procedures, 224 in supervised field experience, and 271 in dental laboratory and office practice.

The National Committee for Careers in Medical Technology (1969) reported on education and career development to review the forces that are changing manpower needs and to seek ways to staff medical laboratories more effectively. The following aspects of the problem were discussed: 1) need for detailed analyses of personnel needs; 2) effects of technology and automation on laboratory practices; 3) attracting, educating, and retaining qualified personnel; 4) achievement of high quality education and training; 5) ways of keeping up-to-date; 6) career mobility and equivalency; and 7) certification and licensing of personnel and accreditation of schools.

In addition, Kahler (1969) prepared a guide for program planning for medical laboratory technician programs.

Penningroth (1966a,b) reported two conferences to explore the role of the community college in training mental health workers. The California Society of Psychiatric Technicians (1969) described their organizational relationship to psychiatric attendants and technicians. Cortazzo and Orkin (1970) described the Mental Retardation Technician Program at Miami-Dade Junior College (Florida). Becker (1967) studied the needs for training medical assistants; and M. Baird (1969) and Towle (1969) discussed programs for medical secretaries.

Careers in Public Service

This is a rather amorphous category that includes a variety of new occupations and of new training methods for more well-established occupations.

Concerning law enforcement education programs, Crockett and Stinchcomb (1968) prepared guidelines for use in community colleges. Described and discussed are: 1) the qualifications, both education and personal, of the modern officer; 2) the wide range of career choices for the candidate; 3) the value and functions of an advisory council; 4) selection, qualifications, and responsibilities of the program director and his teaching staff; 5) various degree, special training, and certificate programs; 6) facilities and equipment on or off campus; 7) recruitment of pre- and inservice students; 8) cadet programs on a work-study plan; 9) maintenance of and need for public relations; and 10) continuing program evaluation. Available police science degree programs throughout the country are listed as part of this study.

From a statewide study (California) of the occupation of firemen, Allen (1968a) noted a concern to: 1) identify the duties and responsibilities of each rank in the fire service; 2) identify the training and educational requirements of each rank; 3) determine who is best qualified to give the necessary training and education; 4) develop a comprehensive training program for all levels of the fire service; 5) raise the competency and efficiency of the fire service through improved training and education methods; 6) analyze services being rendered at the present time and determine if other services can be effectively rendered in the future; and 7) develop an organizational structure to implement the results of the study.

Also in this category, Brooks and Kielbart (1967) described the institution of a fire science program at Shasta College (California).

The community college plays an important role in developing traffic specialists and technicians (Bishop, 1968). The technical, professional, and administrative aspects of the operation and administration of the nation's highway transportation system currently involves more than one-half million persons and the need for traffic specialists and technicians is exceeding the supply. The community college can play an increasing role in training existing personnel in government, business, and industry to up-grade their performance; recruiting and training high school graduates into community college programs; and informing students currently enrolled in other fields of the opportunities in the traffic program. Appropriate areas for community college programs are motor vehicle administration, traffic engineering, police traffic services, driver and traffic safety education, commercial highway transportation, and general education with a basic traffic core.

There are implications of career openings in social welfare occupations for priorities in occupational education (Teeple, 1968b). National goals in social welfare are basically concerned with translating the promise of American life into a closer approximation of reality for the aged, the dependent, the disabled, the disorganized, and the unemployed. Administering social welfare programs may create as many as 400,000 career openings in the 1970's, of which 175,000 will represent openings for junior college or high school graduates. Most of the new social welfare programs will be mainly concerned with problems of the central cities or large metropolitan areas. A realistic goal for vocational education in social work would be 500 to 1,000 graduates a year in each of the nation's major metropolitan areas.

Lees Junior College (Kentucky) conducted a special project on the recruitment and training of social welfare assistants for the Appalachian area (Eslinger, 1968). White and Hamilton (1969) described community college programs for public service occupations, including inspection services, civil engineering, accounting, library services, recreation, planning, and government supervision and management.

The City University of New York (1968) issued a progress report on the educational component of its Public Service Careers Program. Parallel with on-the-job training, this program provides remedial courses in high school equivalency, human relations, and English as a second language, to help qualify candidates for public service careers in the Department of Hospitals, Department of Social Services, and Board of Education.

Caldwell Community College (1970) described a program of instruction for those interested in working with the handicapped. Grambs (1970) prepared an annotated bibliography on para-professionals in education and teacher aides. Thomson (1969) described the instructional aide program at Shoreline Community College (Washington). Feirer and Lindbeck (1970) reported on the development of community college curricula for future teachers of industrual education. In a survey of vocational training for library technicians (Martinson, 1965), 24 institutions were identified as offering such programs. Nicholson (1967) reported on a conference at which library personnel needs in the Sierra College (California) employment area were considered. Dart (1968) described such opportunities in the San Bernadino College (California) district. Shores (1968) developed a course of study for the preparation of library technical assistants.

Lutzin (1969) discussed the lack of trained personnel in the recreational field; and the American River Junior College (1969) provided a summary of recommendations of a conference on that subject.

Koch, *et al.* (1966) described the growing need for urban development assistants and appraised a junior college curriculum for that purpose.

INSTRUCTION

The following sections deal with varying aspects of instruction in occupational programs in the community colleges.

Standards/Accreditation

Messersmith (1969) studied the following aspects of specialist instruction in occupational programs in post-secondary institutions: 1) extensiveness; 2) effects upon program development; and 3) concerns of specialized agencies. His conclusions were that the specialized agency visualizes its role as protecting the welfare of the public, while the institution perceives the agency as a source of help in improving programs and considers specialized accreditation a device for increasing prestige, attracting better students, and securing funds. Also, specialized agencies have not proliferated at a great rate; regional and specialized accreditation do appear to reinforce each other; and the task to encourage growth appears to devise a means by which each of the forms can facilitate the other.

A national conference on accreditation of public post-secondary vocational education programs was held to bridge the gap between the accrediting agency and vocational educators, provide a forum for the identification, discussion, and recommendation of solutions of accreditation problems. (The Center for Occupational Education, 1970.) A second such conference is reported by Ash (1970).

According to R. Davis (1966), traditional requirements for regional accreditation should not present important problems on the evaluation of technical and vocational programs. However, there must be considered: 1) the preparation of personnel who are knowledgeable enough to evaluate fairly the total program of an institution without the need of the specialist for each program; 2) institutional general education requirements; 3) the place of general education as an integral part of vocational-technical programs; and 4) the recruitment of faculty competent to relate general and technical education in their instruction.

The National League for Nursing (1968) assembled a set of papers dealing with the accreditation of associate degree nursing programs. The American Occupational Therapy Association (1967) issued a set of standards for associate degree occupational therapy assistant programs.

Stanton's (1967) set of standards for vocational education includes: 1) effective use of lay advisory committees; 2) a range of offerings compatible with community survey results; 3) intraschool, interagency, and industry-education coordination; 4) occupationally competent teachers; 5) effective placement and follow-up procedures; 6) effective student recruitment and selection; 7) adequacy of facilities and equipment; and 8) continuing evaluation.

Methods

Wiegman (1969) attempted to stimulate thought and action to improve general education in occupational programs offered by junior colleges. Following a review of the unsatisfactory status of present curricula, a rationale and proposal for providing more adequately for students' total needs is presented. Desired changes within general education offerings include opportunities for students to become acquainted with the requirements of their future employers; to participate in on-the-job training programs; to develop cognitive skills, attitudes, and self-concept during in and out-of-the-classroom activities; to become acquainted with aesthetic, literary, and intellectual areas; and to develop community awareness.

Some general conclusions from a study of methods of teaching agricultural occupations in community colleges were: 1) the public is demanding supervised occupational experience for students enrolled in occupational education; 2) students are receiving better instruction at the high school level; 3) there is a trend in post-high school curricula for cooperation among the various vocational services; 4) an increasing need exists for agricultural management ability and 5) areas served by community colleges should be large enough to support sound technical programs (Sidney, 1968).

Nangle (1967) reported on the concept of centers for health occupations education. This approach to education for diverse careers in the health services recognizes that some common understandings are required by all health workers, that inter-disciplinary teaching is possible, and that centralized equipment and services could be available to all the students. The educational effort could be in a setting which perceives the relationship among the various kinds of preparation rather than the separateness of each course.

Barlow (1963) surveyed junior college work experience education programs in 18 California junior colleges. In superior programs, the total work experience program involved activities challenging to the student and directly related to the goals of the program, criteria were established for student selection, and an objective evaluation system for the program was maintained.

Cooperative Work Experiences

Hayes (1969a) examined cooperative work experience education programs in terms of their scope and success in meeting student and community needs. He recommended that only work stations relevant to student objectives should be selected, advisory committees should be encouraged to participate in activities, counselors should deter students from entering programs without interest in the occupation, and coordinators of college programs should obtain feedback from high school programs. In a second report, Hayes (1969b) identified the following difficulties: 1) lack of coordinated supervision by college and employer; 2) little relation of college course to job experience; 3) conflicts in work and classroom schedules; 4) student overinterest in the paycheck; and 5) occasional poor placement of students.

Other reports on cooperative work experience programs are by Boyer (1970), Bennett (1968), Wooldridge (1966), Litzinger, *et al.* (1969), and Miami Dade Junior College (1969).

Clinical Facilities

The New York State Education Department (1966) issued a guide to the selection of clinical facilities for an associate degree nursing program. Basic considerations include the philosophy of the educational program and the attitudes of the personnel of the potential cooperating agency to the educational program, patients, and agency nursing staff. Physical facilities, nursing care, and formal contractual agreements are discussed.

The American Association of Junior Colleges (1968b) has reported on extending campus resources by using clinical facilities for health technology programs. The guide described: 1) the important difference between clinical practice and work study programs; 2) the selection of off-campus facilities predicated on a thorough analysis of the program's needs versus the feasibility of on-campus simulation of a service environment; 3) the establishment of rapport between clinic and college personnel with agreement on the goals of the program; 4) the number and kind of clinical facilities needed for different courses; 5) the need for keeping up with rapid changes in the field; 6) an outline of responsibilities for instruction, supervision, and evaluation; and 7) contractual agreements to clarify the shared and separate roles and responsibilities of clinic and college personnel.

Uehara (1968) studied the frequency of errors and areas of weakness in business communications classes. He concluded that having successfully completed prerequisite courses and review work on style does not prepare students to write effective business communications. He recommended that students be informed of the importance of one idea over another and given the ability to construct them in order to effect this relationship that students should develop their power to reason effectively by analyzing problems, judging reader responses, weighing values, and arriving at sound solutions; and that the teacher should enlist the help of other business teachers in obtaining various letter samples.

White (1970) studied the effectiveness of an individual study approach to associate degree nursing. The results did not indicate that the individualized approach resulted in significantly higher achievement levels, but achievements were as good as by the traditional approach.

Multi-Media Methods

Allen (1968b) reported on a teaching system designed to stimulate polysensory learning by using multi-media instructional materials which use as many of the physical senses as practical to augment traditional instruction. These include motion pictures, film strips, audio tapes, models, and mock-ups.

Yoder (1969) reported on the effectiveness of programmed material in problem solving for technical physics courses for industrial technology students. Krejcie (1968) studied relative effect to media upon student enrollment in engineering technician programs. Folgueras (1966) reported on the use of audio-tutorial laboratory techniques for nursing training. Kristy and McDaniel (1968) and Putnam (1970) devised programmed texts for aspects of allied health training.

Other discussions of the use of the audio-visual devices include: Edwards (1969), Jarrett (1970), Perlberg (1968), and Love (1969).

Teachers/Administrators

In his study involving teachers, Silverman (1970) presented statistics on the education professions, including number of teachers, institutions in which they teach, whether there are sufficient numbers to meet existing needs, personal and professional characteristics, and the ways in which persons enter teaching as a career.

Differences of attitude instructors might hold towards occupational and academic studies that would detract from or counter the efforts to provide a satisfactory environment for the occupational student were searched for by Oppelt (1967). Vocational instructors showed equally favorable attitudes toward both occupational and academic students and viewed all students more favorably than academic instructors. The academic instructors viewed academic students more favorably than occupational students.

Hamill (1967) studied the influence of teachers in four-year colleges and universities as reference groups for teachers in community colleges. Junior college teachers with academic assignments and greater academic preparation leaned towards reference group adoption. Teachers of applied subjects and those with five or more years experience in the field tended towards the community college concept.

M. Kelly (1968) described a project for the development for two-year college technology faculty. The objectives were to aid an individual to be aware of himself as a teacher and as a participant in the two-year college environment as well as in the larger community; to identify the various roles of faculty members; and to ease the transition of the individual from his former work role to the role of a faculty member in a community college.

Carroll and Ihnen (1966) reported on a conference on supply and demand of teachers of occupational education in the South.

Barlow (1967) presented profiles of trade and technical teachers in California junior colleges. Information includes subjects taught, age, sex, marital status, type of school credentials and education, earnings, status, and organizational affiliations. The National Science Foundation (1968) reported on the experience and employment characteristics of junior college teachers of science, engineering, and technology.

In Gianini's (1967) study of the professional competencies of teachers of technical education in Florida, findings showed that: 1) teachers who held academic degrees in addition to the degree in their specialty areas scored significantly higher on a comprehensive examination; 2) higher scores on a sociometric measure were generally achieved by those with no other experience than teaching; 3) higher cooperativeness ratings were generally received by those who achieved their technical degree in the Northeastern states; and 4) there were no significant differences based on colleges attended, time lapse between degree and certification, and the number of years employed in other occupations.

Messerschmidt (1967) studied the characteristics of part-time instructors in vocational-technical education among community colleges in Michigan. Ratner (1967)and the University of Florida (1965) reported on projects to train teachers for nursing programs. The National Sanitation Foundation (1968) reported on a program for the preparation of teachers for environmental technology. Other teaching preparation programs were described by Ragsdale (1970) and Fuller (1969). Birkholtz (1969) described a systematic faculty internship program at William Rainey Harper College (Illinois).

The duties and qualifications of vocational-technical education directors and certain aspects of their administration were the subject of Fielding's study (1966). His conclusions were: 1) these directors will increase in number; 2) they should have industrial experience, particularly in the subject area; 3)their education should include an engineering, vocational-technical or industrial major, and graduate work in educational administration and vocational education; and 4) their professional background should include vocational teaching and, if possible, junior college administrators.

From Gates' (1964) study of the administrators of technical education programs in junior colleges in the United States a stereotype was portrayed. The typical administrator was 48 years old, male, and white; had an academic certificate from high school, a college major in industrial arts or industrial education, and a masters degree in education, though he had not had a course in the junior college; and had secondary school experience, plus experience out of education.

In Butcher's (1968) list of desirable characteristics of vocational department heads, the most important was technical knowledge. Vocational education background, student-centered approach, and an understanding of basic principles of learning were also significant.

Resources/Materials

Baldwin (1966) published a directory of associations, societies and organizations with resources available for junior college vocational-technical education. Wattenbarger (1968) described library services for vocational-technical programs and Sullivan (1969) prepared a bibliography of library materials for vocational-technical programs.

An advisory committee in occupational education in the junior college has a specific role (Riendeau, 1967). Three types of advisory committee include: a general committee to review the total occupational program and to advise on needs and priorities, occupational advisory committees which advise the college staff about instructional programs in specific occupations, and the joint apprenticeship committee serving in an advisory capacity, but also having an administrative function.Advisory committees provide expertise in matters of equipment, facilities, and curriculum content. They assist in obtaining public support, raising scholarship funds, recruiting instructors, arranging field trips, providing speakers, placing graduates, promoting industry cooperation, and improving college-community liaison. Members should have competence, interest, character, and time. The college should make most effective use of their services and appropriately recognize their efforts.

For further discussions of advisory committees, see Hoerner (1967), West Valley Junior College (1968) and Martinie (1969).

In his discussion of the role of the university in community college technical education, Gillie (1968) suggested six services that the university could perform: 1) directing research efforts in the teaching and administration of technical programs; 2) collecting and analyzing data on the characteristics of technical students both sociological and academic; 3) developing with the junior college a model for continuous and longitudinal evaluation of the effectiveness of the technical programs; 4) helping in the design and development of new curricula to keep pace with emerging technologies; 5) aiding in the modernization and updating of existing curricula; and 6) assisting in preparing programs of special relevancy to disadvantaged urban youth.

Watson (1970) discussed the liaison between corporations and the community college. Alden (1968) described the activities of the Appalachian Regional Commission Education Advisory Committee.

The Public Health Service (1966b) described the provision of the Allied Health Professions Education Improvement Grants. In their feasibility analysis of a single integrated central computer system for secondary schools and junior colleges, Computation Planning, Inc. (1968) found that a central computing facility capable of serving 50 schools with a total enrollment of 100,000 students is feasible for a cost of $18 per student per year.

The present and future status of junior college student personnel programs study by Collins (1967) concluded: 1) basic student personnel functions are not being adequately performed in the majority of the colleges studied; 2) certain institutional characteristics such as the clarity of staff roles are more determinate of the quality and level of program than either placement of administrative responsibility or graduate training level of the staff; 3) student evaluations cast doubt on widely expressed views on program effectiveness; and 4) programs can be classified as strong or weak on the basis of developed criteria.

Plans/Administration

Teeple (1970) suggested the following variables in planning occupational education programs: the necessity as well as the availability of training, the appeal of the job to students, and ability of the program to train students for the job.

Statewide plans for occupational education have been published by the Pennsylvania State Board for Vocational Education (1964); for Hawaii, Harris (1965) and Ruhig (1968); New York State, the State University of New York (1965); California, Halbower (1967); Colorado, Colorado State Board for Community Colleges (1968); Florida, Boyle (1965); Oregon, Howard (1966); and Illinois, Grede (1970); Occupational education plans for individual colleges have been published by Mansfield (1967) for Chicago City College; Tadlock (1968) for Tulare and Kings County, California; Metropolitan State College (1968) for Denver; and Beck (1969) for the Los Angeles Community College.

STATUS AND RESULTS

In the final analysis, the most important aspects of occupational programs are the results they produce. In the following sections, certain aspects of these results are summarized as reported in the literature. The differentiation within some of the sub-headings is rather arbitrary and articles frequently could have been discussed in several classifications.

Evaluation

The California State Department of Education (1968) proposed a system reporting job placement follow-through data. Hecker (1967) discussed interest and intellectual indices related to success of students in technical programs. Terminal business students typically expressed a positive interest in occupations with a management function, a high aspiration level, and tended to reject science and technical occupations. Entering general education-science students had high ability, strong achievement background, positive interest in science-related occupations, and rejected business management functions. General education non-science students were characterized by their low masculine-feminine score and positive interest in social service and verbal-related occupations. Technical students expressed interest in science occupations and rejected social service occupations. Trade students had low ability scores and poor high school achievement, tended to reject occupations reflecting social service, verbal, or computational aspects, and had interests directed toward physical, outdoor occupations.

In a study of junior college graduates, McCallum (1968) included those who had made initial or deferred decisions to major in technology programs. The initial and deferred groups could be differentiated by academic ability and educational achievement, but not by socioeconomic factors. Initial students more often took majors begun in high school; deferred students were less influenced by teachers or counselors but both were equally influenced by parents or college students.

Hendrix (1968) analyzed the grade point averages of students in selected occupational courses as compared to students in general programs.

By interviewing the president or program administrators in 50 North Carolina community colleges, Matthews (1970) obtained information on job placement and follow-up, area economic data, collection of planning data, advisory committees, and development of capabilities for program related research.

Matteson (1966) examined the kind of employment taken by junior college graduates and related it to their college training. He concluded that: 1) the junior college generally serves the student well in skills, knowledge, and human relations; 2) it provides terminal programs for work at various entry levels; 3) it should increase its counseling services especially to encourage early career choice;

4) terminal and transfer students each have certain advantages over the other; and 5) by follow-up studies, the college should constantly evaluate its program, teaching and counseling.

Bates (1968) examined the relationship of selected variables to interstate geographic mobility of technician graduates of associate degree programs in Oklahoma. He concluded that a graduate who migrated out of state was likely to be of lower age, married, of upper or middle socioeconomic class, from urban areas, prefering urban areas, and a technical institute graduate rather than a community college graduate, and that graduates remaining in the state do so for personal or social reasons.

In the New Hope project (California), Pearce (1966) studied drop-out patterns. The actual drop-out rate was 12 percent. Of the drop-outs, 42 percent gave reasons which were within the capacity of the program to correct, while 21 percent dropped for work purposes.

Specific evaluations of follow-up studies have been published by the following: Bowman (1964) on associate degree nursing programs in California; Morgenstein (1970), business programs at Nassau Community College; Storer (1967), Chicago City College graduates; Davison (1968), occupational graduates of the community colleges of the City University of New York; Ellerbrook (1969), the public junior colleges of Texas, Wood (1967), agricultural programs in Illinois; Bell (1966) one-year programs in the community college system of North Carolina. Programs have been evaluated in studies by Larson (1968b), marketing programs; Pearce (1968), business and industrial management programs; Larson (1968a), retailing programs; Stephenson (1967), dental assisting programs and (1968), electronics programs.

Follow-up

The evaluative processes used to assess the effectiveness of vocational-technical programs is the subject of Bruhns (1968) discussion. Graduate interviews concerning job, school, or other plans can relate the question closely to the program. Career follow-up studies going beyond mere placement to identifiable changes in the trainee's work life can reveal a program's success or failure. Basic achievement tests are useful, official licensing exams are less so.

From a panel of consultants on vocational education Emerson (1963) reported on the needs for workers in various fields. Yeo (1965) compared curricular judgments made by college officials and by educational theorists for a new community college technical program. The actual curriculum was found to be inferior even though it purportedly had been designed to meet the need of the community and its students. The Center for Studies in Vocational and Technical Education (1966) reported on a conference on the evaluation of innovative vocational-technical curricula. Barker (1969) published a profile of accredited associate degree nursing programs.

R. Smith (1969) studied the nature and frequency of curricular offerings in junior colleges in the United States. Most significant increases in curricular offerings were found among occupational courses, although the number of junior colleges with such offerings had not substantially increased. In addition, while occupational education receives increased attention at the public community

college, the current emphasis there is currently on transfer courses. This is true to an even greater extent at private junior colleges.

Schmidt (1966) discussed factors affecting the establishment of associate degree programs in nursing in community junior colleges. The volume of full-time enrollments is the characteristic that most influences the colleges. The comparatively high cost of nursing programs, difficulty in providing the necessary physical facilities within the college, and inadequacy of clinical facilities are factors which deter program development. Finding a qualified nurse administrator was also a crucial factor.

The Engineers Joint Council (1968a,b) reported on the number of degrees awarded in engineering and industrial technology and of the prospects for engineering and technology graduates.

Young (1967) surveyed library technician programs in junior colleges. San Mateo College (1968) used operators of beauty salons to evaluate its cosmetology curriculum. Hall (1968) published an evaluative inventory of business education.

Evaluative and follow-up studies of career programs in various states have been published by the following: for New York and New Jersey by Winters (1969); for Oregon by Minear (1966) and Cherry (1966); for Michigan by Harris (1965); and for Alabama by Auburn University (1964).

State studies have also been made for: Arkansas, Sparkman (1968); Ohio, Ohio Board of Regents (1968); Iowa, Iowa State Department of Instruction (1968); North Carolina, the North Carolina State Board of Education (1968); Florida, Florida State Department of Education (1965); Illinois, Grede (1968) and Pachucki (1969); Hawaii, Gillie (1970b); and Maryland, Reese (1967).

Individual programs at individual institutions have frequently been evaluated and reported on: technical education in the North Orange County Junior College district (California). Allen (1968); para-medical curricula at Los Angeles City College, Whalen (1968); teacher aid training at Seattle Community College, Lunneborg (1969); developmental program at the Chicago City College, Dave (1968); basic education programs by Santa Barbara City College (1967); and the business education program at Kapiolani Community College (Hawaii), Taniguchi (1970).

Articulation

The Oregon State Department of Education (1968) published a guide for articulation of occupational programs between high school and post high school institutions. It suggested approaches for providing: 1) meaningful occupational education throughout the junior high school and high school structure; 2) opportunities for attaining entry level occupational competency in the secondary education complex; and 3) occupational education at the high school which is appropriate to continuation beyond high school. A pattern of occupational education for secondary schools was suggested, and approaches to organization, content, scope, and sequence of 12 cluster-based occupational curricula presented. The roles of high school occupational programs are identified as providing specific preparation for those who drop out and those who do not continue beyond high school, and a complementary learning experience to those who continue their occupational education.

The study by Minar, *et al.* (1969) of political relationships between elementary-secondary and higher education covers 12 states. This reveals that while at present there is little conflict between the two levels, there is also little cooperation. Factors lying behind the growing conflict are a breakdown of the traditional forces of educational politics at the elementary-secondary level caused by disunity of teachers and administrators, and the increasing cohesion and political power of higher education.

Brick (1967) analyzed selected business and technical programs in high schools and in two-year colleges with a view towards initiating articulation procedures in counterpart offerings.

Usdan (1969) discussed the developing relationship between elementary-secondary and higher education. Beckes (1969) discussed building of junior college curricula on high school programs. Oleson (1970) suggested the possibility that two-year technician training programs should be extended to four years, culminating in a bachelor of technology degree.

A study of Auburn University (1966) delved into institutional policies regarding acceptance of transfer of credit from technical-terminal programs in junior colleges. Of 17 state universities and land grant colleges in the Southern region, nine indicated that no work completed in a terminal technical program in a junior college would be accepted in a transfer to a baccalaureate degree program. Those institutions which did indicate concern with this problem seem to have evolved a policy whereby terminal occupational work is accepted in transfer either on the basis of satisfactory scores on proficiency exams, on the basis of validated work, or outright, provided that the student's work had been satisfactory.

Bloomquist (1967) dealt with the articulation of occupational education in Clackamas County (Oregon); and Marlsbary and Holmes (1969) studied education for distributive occupations with implications for better articulation of high school and community college programs in Connecticut. Chandler (1967) described a cooperative program of San Bernadino Valley College (California) and surrounding high schools in auto mechanics, applied electronics, and office occupations training.

Costs

After analyzing full-time equivalent operating costs from data from seven states, the Virginia Community College System (1968) concluded that small colleges cost more to operate than larger colleges; costs increase as more students enroll in a college, but not in proportion to the enrollment; vocational and technical programs cost more than liberal arts and transfer programs; cost of new occupational programs are especially high; new programs and new colleges cost more to operate.

Cage (1968) attempted to determine relationships between unit costs per student contact hour for post secondary transfer curricula and selected technical programs. Enrollment had the greatest degree of inverse relationship with student cost. Administrative and plant operation expenses were contributing factors to differences between schools in student costs. Instructional expenses were related to enrollment and student cost. Rental of buildings on some campuses increased

costs. The vocational-technical programs were more expensive than transfer curricula.

Research of curriculum costs in comprehensive community colleges by Parry (1968) found technical education to be more costly than vocational education, while college-parallel was the least expensive. The study developed a mathematical formula for budgetary purposes that would provide differential financial treatment for component costs.

Problems

The Education Commission of the States (1968) dealt with problems in vocational and technical education. The American Association of Junior Colleges (1966a) reported a conference on the identification and resolution of problems inhibiting the expansion of occupational programs in the junior college.

Regarding junior colleges, Sietz (1970) discussed the problems and prospects of technical education. Authorities have pinpointed the problems to be 1) need for effective guidelines, 2) need to build prestige, and 3) need for more and better trained teachers.

The major problems in technical education were analyzed at a conference reported by Foncannon (1968, 1969), specifically the preparation of physical science and engineering technicians. The recommendations of the conference were: 1) to establish the unique identity of technical education; 2) to inform a wider public; 3) to clarify articulation with universities and high schools; 4) to devise a satisfactory vertical structure for technical courses; 5) to encourage supporting legislation; 6) to refine techniques to study supply and demand; 7) to continue study of regulatory agencies; 8) to examine motivations of high school students; 9) to reduce the attrition rate; 10) to help teachers keep up-to-date; 11) to improve pre-service teacher training; 12) to anticipate rather than accommodate technological change; 13) to explore work-study programs; 14) to publicize successful curricula; 15) to continually evaluate program objectives and relevancy; 16) to develop teaching aids; and 17) to welcome new teaching methods.

In his study of urban problems (housing, employment, and education) affecting junior colleges Hankin (1967) suggested how these colleges might act on these problems. The newness of some urban community colleges, a deluge of student applications, lack of community response to offers to help, and lack of facilities and money were among the reasons the college gave for lack of involvement. It was felt that poor overall planning and conservative attitudes of administration, faculty, students, and parents were also inhibiting factors.

Williams (1970) analyzed and prescribed needed educational services which could be best offered to black students. The community college should best focus on undergraduate academic and vocational-technical education and public service for these students.

Special And Experimental Programs

Knoell (1966) proposed a program that would include the disadvantaged in urban areas and the lowest quarter of high school graduates.

Concerning an experimental junior college program in industrial technology for disadvantaged youth, Lowens (1966) described a comprehensive curriculum structure for its organization and operation. A first curriculum was a remedial program designed to prepare general diploma high school graduates who are ineligible for college admission for the second curriculum, a two-year vocational program in industrial technology.

The Women's Talent Corps attempted to establish permanent positions in community agencies at a new entry level by the development of an action-centered approach to the training of women from ghetto areas for pre-professional jobs in hospitals, welfare agencies, and schools (Cohen, 1967). The corps now seeks to put its educational program on a permanent basis as a model two-year college for human services. The college will: 1) help students prepare for equivalency examinations at the secondary level as they begin college work; 2) prepare them at once for work in the helping professions and place them in jobs; 3) use field work for methods teaching; 4) offer a core curriculum based on the needs of the professions and the populations served; and 5) offer a flexible program including preparation for transfer to a four-year college.

Gillie (1970) published a collection of essays on curricula for occupational education emphasizing the needs of urban and alienated youth.

Rock Valley College (Illinois) (1968) described its career advancement program, a joint effort by the college and industrial firms in its district to expand educational opportunities to match college programs to local needs, and to help industry meet its present and future technical manpower needs.

Junior colleges have a role in career programs which are designed to recruit, train, and place human service aides as workers in health, education, and welfare agencies (Shatz and Steinberg, 1968). The training program includes a series of core curricula beginning with generic issues common to all of these occupations, a second core focusing on one human services area, and the aide specialty combining specific skills and on-the-job experiences.

McCalley (1966) described the tools and techniques needed for basic education programs for adults. Gillie (1967) described a two-year general technology program which prepares disadvantaged youth to enter gainful employment and enhance their opportunity to improve their situation in life. Half of the program consists of specialized training in machine shop practice, selected topics in chemistry, basic electricity, basic electronic instrumentation, vacuum technology, cryogenics, selected topics in mathematics, and selected topics in physics. The rest of the program provides general education and cooperative work experience.

Brice (1966) discussed vocational programming for the retarded; and Oregon State University (1970) the role of the community college in training the disadvantaged-handicapped student. Craig (1969), Brookey (1969), and Fellendorf (1970) discussed vocational and technical programs for the deaf.

The Illinois Research and Development Coordination Unit (1968) published abstracts of 38 experimental projects in vocational and technical education.

Venn (1967) described pre-technical post-high school programs. The San Francisco City College (1967) reported on an experimental summer program for high school seniors and faculty that explored various technical curricula. The California State Coordinating Council for Higher Education (1967) suggested approaches to occupational programs in junior colleges of more than two years in length. Jacobs (1966) described a program at the Spokane Community College for training retail checkers and sales personnel in a life-like grocery training unit. Arnold (1966) described the apprenticeship building trades program at San Diego Mesa College. Wright (1969) described organizational innovation at Parkland College in Illinois.

RECOMMENDATIONS AND NEEDED RESEARCH

The literature that has been surveyed in preceeding sections was identified by a computer search of *Research in Education* and *Current Index to Journals in Education.* This search proved to be less than complete. The researcher who desires further in-depth literature in some areas should consult reports of the U.S. Office of Education and of the U.S. Department of Labor, masters and doctoral dissertations (which probably comprise the bulk of published research in the field), and descriptive reports from individual institutions (which certainly exist in profusion and could provide most of the factual basis from which conclusions could be drawn).

The reviewer of the literature on occupational education in the community college is faced with a massive task. It is probably too large to be well done in one volume with finite limits. The most important aspects of occupational education are curriculum, instruction, and results (with the general sub-headings listed earlier in this report).

A recommendation is that periodic (annual or biennial) reviews of each of these separate areas be commissioned. This could possibly lend to this field the organization and cohesion that exists for most of the hard sciences by the publication of the Annual Review series.

Basic to any research in or analysis of occupational education is a secure and reliable data base. This is not readily available. The answers to such comparatively simple questions as the number (and names) of community colleges that offer programs in electronics, or the number of associate degrees awarded in secretarial science, or the enrollment in law enforcement programs, defy a quick search. There is a related problem that the available data from different sources are not necessarily comparable from institution to institution, from state to state. It would seem obvious that someone, the federal government is a good candidate, should define items so that data be comparable. Certainly significant steps have already been taken, but much remains to be done.

Also, efforts could be made to collect and rapidly disseminate basic accurate and comparable data on occupational education in community colleges. This collection should supplant several of the present inadequate systems, not duplicate them.

There are at least 100 different occupational curricula offered at community colleges in the United States (and they appear under at least twice that many titles). The profession would profit by more descriptions of and comment on specific curricula.

Within a given field (e.g. drafting) many curricular variations appear around the country. While there are moves afoot through state agencies and accrediting groups to move toward more uniformity, the diversity would seem to be a good thing. Not only does it reflect real differences in circumstances in different parts of the country, but it also may result in genuine faculty involvement in curriculum development at local colleges.

Supposedly the establishment of a curriculum at a college is the result of the determination of a local need, usually by survey of potential employers. Not many such surveys exist in the literature, but undoubtedly many have been conducted. The profession would profit by publication and analysis of instruments that are used for this purpose.

Most surveys solicit only quantitative data on job vacancies, present and anticipated. There are few attempts to accurately and specifically outline what a person in a given occupation (e.g. a draftsman) actually does on the job.

Considerable attention should be given to job analysis, and research should be conducted on the best way to translate job requirements into curriculum content.

Instruction and the resources to implement instruction--materials, equipment, facilities, and staff--receive considerable attention in the literature. This is perhaps the area of greatest concern to the individual faculty member.

The philosophy of the community college to extend educational opportunity to a wider cut of the population has important implications for instructional method. One reasonable inference is that there should be substantial variation, even within one institution, in instructional methods in order to accommodate differing interests and learning styles of assorted students. The largest contribution to the literature is descriptions of various audio-visual aids. It would be useful to have available more descriptions of other methodology.

More research efforts need to be directed toward controlled experimentation in instructional methods for differing student populations.

In these days when the magic word is "accountability", the most fundamental aspect of occupational education is the results achieved. This is usually expressed by an equation or an inequality with dollars on one side and measured goals on the other.

There is a paucity of literature on the costs of occupational education and on the differentiation of costs for various programs. It is difficult to explain a lack of interest in such data.

It is recommended that extensive study be given to the costs of occupational education. This probably presumes uniform accounting systems. Should this be possible for research purposes without it becoming an unnecessary and burdensome restraint on legitimate variations in operation, it would be highly desirable.

The factors most commonly found on the other side of the expression are such as number of credits earned, number of degrees awarded, number of students enrolled. These have the advantage that they are quantifiable; the disadvantage that they are not very meaningful in terms of program objectives.

There are many follow-up studies found in the literature that describe what has happened, on the job, to those who have completed specific occupational programs. It would be useful to extend these to those who have not completed and to make appropriate comparisons. It would be highly useful to be able to express the "success" of students in quantitative terms.

But this does not get to the heart of the matter.

It is further recommended that research be undertaken to measure the effect of the curriculum and of its components on the future of the student - how each course or instructional unit has pertinence to the individual's ability to per-

form on the job and to advance in it. Even more titillating is the challenge to measure the effectiveness of the general education aspect of the program.

In conclusion, it seems obvious from a study of the literature that occupational education in the community college is a lusty, growing, bawling phenomenon. It will be certain to continue to grow, to diversify, and to become a more significant factor in the extension of higher educational opportunity. If its growth is to be ordered rather than disordered, research at all levels of administration are sine qua non.

The final recommendation is that a modest three percent of all budgets for operation of occupational education in community colleges be directed toward the support of systematic research in that field.

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